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ABSTRACT

The third of four quins intended to develop computational skills with non-negative rational numbers through applications to business and industry, this guidebook on minimum course content is designed for the student who has acquired basic computational skills with non-negative rational numbers. Topics include measurement and geometrical constructions. Overall course goals are specified, a course outline is provided, and performance objectives are listed. Also included is a set of sample test items for skills and a list of resources. (JP)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

DADE COUNTY PUBLIC SCHOOLS

MATHEMATICS; Rational Applications 3 5213.79
5214.79

SE 018 086

DIVISION OF INSTRUCTION • 1973

ED 093712

QUINMESTER MATHEMATICS

COURSE OF STUDY

FOR

Rational Applications 3

5213.79
5214.79

(EXPERIMENTAL)

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida 33132

1971-72

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Miami, Florida 33132

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PREFACE

The following course of study has been designed to set a minimum standard for student performance after exposure to the material described and to specify sources which can be the basis for the planning of daily activities by the teacher. There has been no attempt to prescribe teaching strategies; those strategies listed are merely suggestions which have proved successful at some time for some class.

The course sequence is suggested as a guide; an individual teacher should feel free to rearrange the sequence whenever other alternatives seem more desirable. Since the course content represents a minimum, a teacher should feel free to add to the content specified.

Any comments and/or suggestions which will help to improve the existing curriculum will be appreciated. Please direct your remarks to the Consultant for Mathematics.

All courses of study have been edited by a subcommittee of the Mathematics Advisory Committee.

CATALOGUE DESCRIPTION

One of four quins which will develop computational skills with non-negative rational numbers through applications to business and industry.

Designed for the student who has acquired basic computational skills with non-negative rational numbers.

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GOALS

1. To improve skills in computation with non-negative rational numbers.

2. To develop greater ability in problem solving.

3. To develop an appreciation of the role of mathematics in business and industry.

OVERALL STRATEGIES

1. This quin is based on the state-adopted text, Modern Applied Mathematics by Gold and Carlberg. Chapters 5,6, and 7 constitute the core of this course.

2. A pretest similar to the pretest included in this quin should be administered to determine the ability of the students to work with non-negative rationals. All deficiencies should be noted, and activities should be planned to help each student overcome his particular deficiencies.

3. Performance objectives are listed only for computational skills. The level of performance in other areas is left to the teacher's discretion and will depend on the ability of the students he is teaching.

4. The purpose of this sequence of quins is to present new topics and practical applications of mathematics to enlarge the students' mathematical horizons while giving them an opportunity to improve their basic skills. The students have attained some measure of success in these skills in previous quins, but many will need reinforcement to maintain the skills they had and to improve them.

5. All of the four Rational Application quins have the same performance objectives, and the pretests differ only in the numbers used in the problems. It should be possible for a student to take any or all of the quins depending on his background, and it would not be necessary to maintain the sequence. For students or classes who need little work in the basic skills, the topics in the book can be stressed and expanded if necessary.

6. Do not cover more than Chapters 5,6, and 7 of the text in this quin as the remaining chapters are covered in the other quins.

PERFORMANCE OBJECTIVES FOR SKILLS

The student will:

1. Add any two or more whole numbers.
2. Subtract any two whole numbers.
3. Multiply any two whole numbers.
4. Divide any whole number of 3 digits or more by any 1 or 2 digit whole number and write the answer with the remainder, if any, in fractional form.
5. Add any two or more whole numbers, fractions, and mixed numbers.
6. Subtract any whole number, fraction, or mixed number from any larger whole number, fraction, or mixed number.
7. Multiply any two or more whole numbers, fractions, and mixed numbers.
8. Divide any two whole numbers, fractions, or mixed number.
9. Add any two or more decimals.
10. Subtract any decimal from any larger decimal.
11. Multiply any two decimals.
12. Divide any decimal by any other decimal of 3 digits or less and round the answer to a specified place when indicated.
13. Find the average of any 10 or less whole numbers.
14. Order any two or more decimals.
15. Order any two or more fractions.
16. Simplify a given fraction when possible.
17. Solve for the unknown term in a proportion.
18. Solve the three cases of percent.
19. Express a fraction in its equivalent decimal form.
20. Round a whole number or decimal to a specified place.

Performance Objectives (continued)

21. Write the equivalent multiplication statement or decimal numeral for an exponential expression.

22. Write the equivalent fraction and decimal for a given percent.

23. Determine the perimeter of any rectangle or triangle given the appropriate dimensions.

24. Determine the area of a rectangle given the appropriate dimensions.

COURSE OUTLINE

I. Skills, as needed, throughout the quin

1. Whole numbers

2. Fractions

3. Decimals

4. Proportion and percent

5. Perimeter and area

II. Formulas from Industry

1. Building

2. Power

3. Automobiles

4. Miscellaneous

III. Systems of Measurement

1. U.S. Measures

a. Linear
b. Square
c. Cubic
d. Capacity

2. Metric measures and conversions

a. Linear
b. Square
c. Cubic
d. Capacity
e. Weight

3. Temperature

a. Centigrade
b. Fahrenheit

Course Outline (continued)

IV. Geometric Constructions

1. Lines

   a. Bisection
   b. Perpendicular
   c. Parallel
   d. Division of a segment

2. Angles

   a. Copying
   b. Bisection

3. Triangles

   a. Copying
   b. Altitudes
   c. Medians
   d. Angle bisectors

4. Circles

   a. Inscribing in a triangle
   b. Circumscribing about a triangle
   c. Locating the center

5. Regular Polygons

   a. Equilateral triangles
   b. Squares
   c. Hexagons
   d. Octagons
   e. Pentagons

6. Designs

7. Ellipse

STRATEGIES

The section on formulas from industry, Chapter 5, not only has provided exercises for students in the use of formulas, but includes pictures and explanations to help make the formulas meaningful. Perhaps the science or industrial arts teachers have equipment which can be used to set up demonstrations or experiments which will make the formulas even more meaningful.

The section on systems of measurement, Chapter 6, covers the United States customary system of measurement, the metric system, and conversions between the two systems. The conversion between the two systems provides an excellent opportunity to practice estimation. For most people it is more important to know that 10 kilometers is "about" 6 miles than it is to know the more exact conversion. Try to give students the "feel" of the difference in size of some of the more common measures.

The section on geometric constructions, Chapter 7, gives step by step instructions for many constructions, but includes no background on the reasons why the directions produce the desired result. Many students would benefit from discussions on the reasons these constructions work. This section provides an excellent opportunity to introduce some geometry informally.

SAMPLE TEST ITEMS FOR SKILLS

1. Add: a. $\begin{array}{r} 429 \\ 506 \\ 58 \\ +\ 675 \\ \hline \end{array}$ b. $4236 + 8524 + 2395$

2. Subtract: a. $\begin{array}{r} 8054 \\ -\ 4322 \\ \hline \end{array}$ b. $3574 - 886$

3. Multiply: a. $\begin{array}{r} 619 \\ \times\ 74 \\ \hline \end{array}$ b. 3405×64

4. Divide: a. $8\overline{)\,6704}$ b. $5167 \div 33$

5. Add and express the answer in **simplest** form:

a. $\begin{array}{r} 5\ \frac{1}{3} \\ +\ 3\ \frac{1}{6} \\ \hline \end{array}$ b. $\frac{8}{11} + \frac{7}{11}$ c. $4\ \frac{2}{5} + 3\ \frac{1}{10} + 8\ \frac{1}{2}$

6. Subtract and express the number in simplest form:

a. $\begin{array}{r} 5 \\ -\ 2\ \frac{3}{8} \\ \hline \end{array}$ b. $\frac{11}{12} - \frac{5}{12}$ c. $\begin{array}{r} 6\ \frac{3}{8} \\ -\ 3\ \frac{1}{2} \\ \hline \end{array}$

7. Multiply and express the answer in simplest form:

a. $4\ \frac{1}{2}$ b. $3 \times 2\ \frac{5}{7}$ c. $\frac{4}{9} \times \frac{15}{16} \times \frac{3}{10}$

8. Divide and express the answer in simplest form:

a. $2\ \frac{1}{8} \div 5$ b. $2\ \frac{1}{4} \div 3\ \frac{3}{8}$ c. $\frac{3}{5} \div \frac{5}{6}$

Sample Test Items (continued)

9. Add: a. 29.62
3.74
+ 18.87

b. 36.9 + 41 + 50.9

10. Subtract:

a. 50.83
- 27.16

b. 49.37 - 8.637

11. Multiply:

a. 623
x .006

b. 33.2 x 4.3

12. Divide:

a. $4.3\overline{)15.05}$

b. $.53\overline{).6215}$

13. Find the average: 44, 82, 91, 32, 26, 42.

14. Select the larger decimal in each pair:

a. .38, .371

b. .06, .302

15. Select the smaller fraction in each pair:

a. $\frac{7}{12}$, $\frac{3}{5}$

b. $\frac{9}{17}$, $\frac{3}{5}$

16. Simplify each fraction:

a. $\frac{22}{33}$

b. $\frac{18}{30}$

17. Solve for n:

a. $\frac{3}{5} = \frac{n}{21}$

b. $\frac{7}{n} = \frac{8}{21}$

18. Solve:

a. What percent of 76 is 57?

b. Find $3\frac{1}{2}\%$ of $2400.

c. 18 is 9% of what number?

Sample Test Items (continued)

19. Express in decimal form:

a. $\frac{3}{8}$ b. $\frac{2}{3}$

20. Round each number to the specified place:

a. 69.23591 to thousandths

b. 1695.864 to hundreds

c. .7461 to tenths

21. Express as decimal numerals:

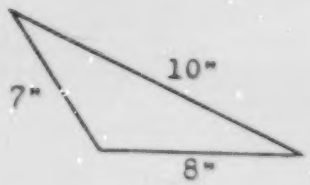
a. 3^3 b. $2^4 \cdot 3^2$

22. Express as decimals and fractions:

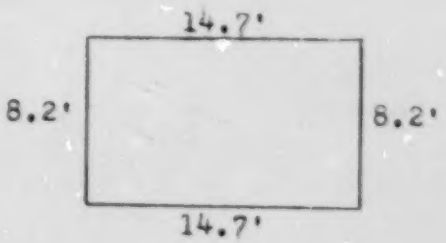
a. 40% b. $6\frac{1}{4}\%$

23. Find the perimeter:

a.

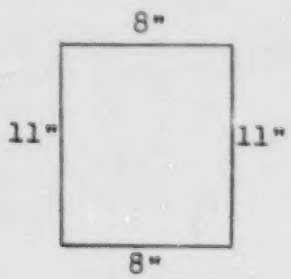


b.

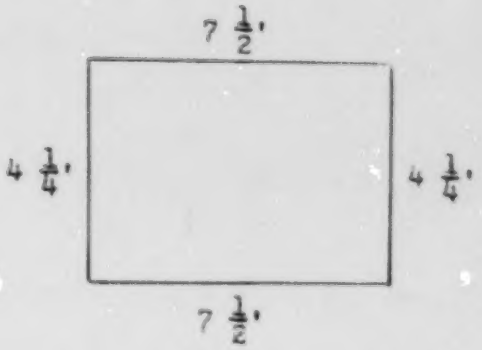


24. Find the area:

a.



b.



ANSWER KEY

1. a. 1668

   b. 7483

2. a. 3732

   b. 2688

3. a. 45,806

   b. 217,920

4. a. 838

   b. $156\frac{19}{33}$

5. a. $8\frac{1}{2}$

   b. $\frac{15}{11}$ or $1\frac{4}{11}$

   c. 16

6. a. $2\frac{5}{8}$ b. $\frac{1}{2}$ c. $2\frac{7}{8}$

7. a. $\frac{135}{8}$ or $16\frac{7}{8}$

   b. $\frac{57}{7}$ or $8\frac{1}{7}$

   c. $\frac{1}{8}$

8. a. $\frac{17}{40}$ b. $\frac{2}{3}$ c. $\frac{18}{35}$

9. a. 52.63

   b. 156.8

10. a. 23.67

    b. 40.733

11. a. 3.738

    b. 357.76

12. a. 3.5

    b. 1.17

13. $53\frac{1}{2}$

14. a. .38

    b. .302

15. a. $\frac{7}{12}$

    b. $\frac{8}{17}$

16. a. $\frac{2}{3}$ b. $\frac{3}{5}$

17. a. $n = 12\frac{3}{5}$

    b. $n = 18\frac{3}{8}$

18. a. 75% b. $84 c. 60

19. a. .375

    b. .66

Answer Key (continued)

20. a. 69.236

    b. 1700

    c. .7

21. a. 27

    b. 144

22. a. .04, $\frac{1}{25}$

    b. .0625, $\frac{1}{16}$

23. a. 25"

    b. 45.8'

24. a. 88 sq. in.

    b. $\frac{25}{3}$ or $31\frac{7}{8}$ sq. ft.

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